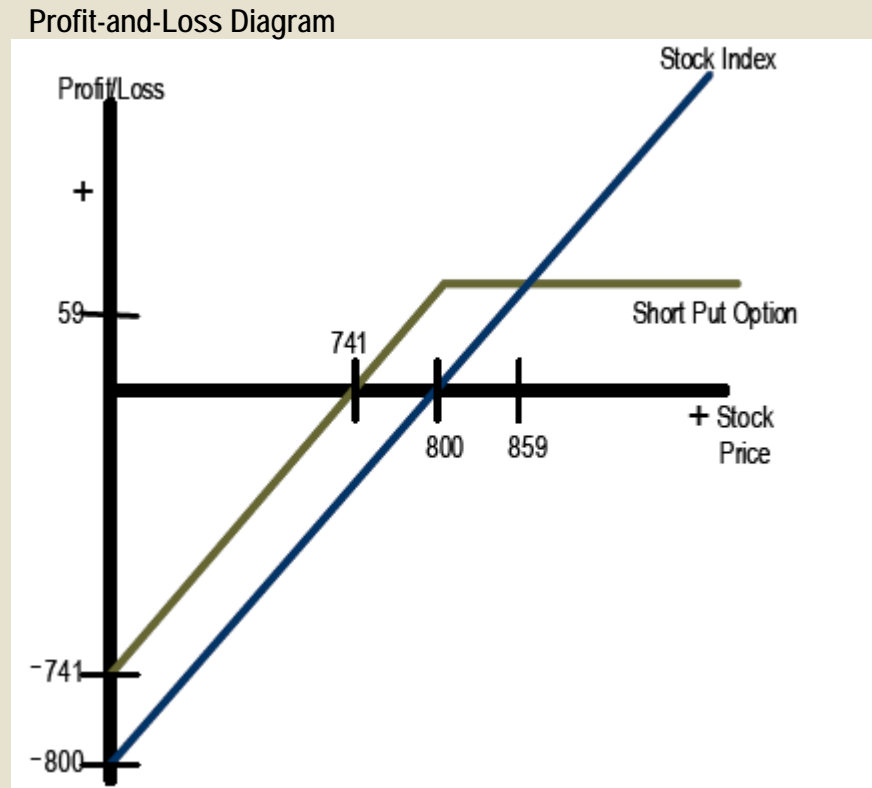

QWAFEFW

Event on Volatility

Keith H. Black, CFA, CAIA
Ennis Knupp + Associates

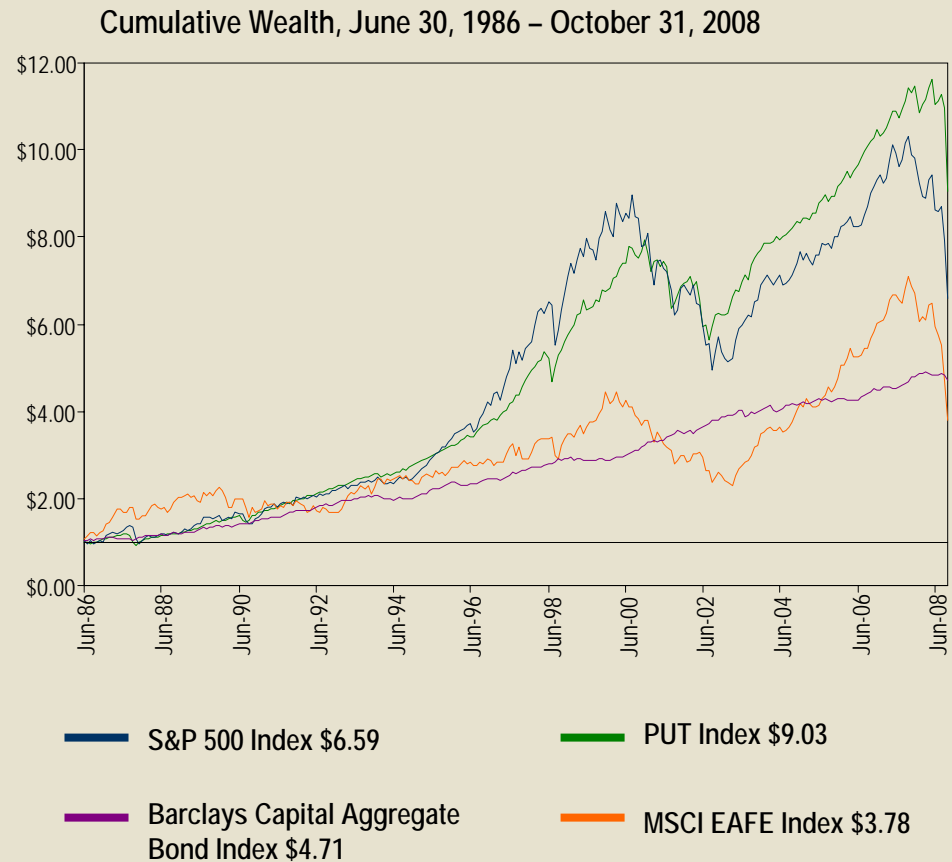
The CBOE PutWrite Index

- “Evaluating The Performance Characteristics of the CBOE S&P 500 PutWrite Index”
- The white paper is available at www.ennisknupp.com or www.cboe.com/put
- The CBOE PutWrite Index sells at-the-money put options on the S&P 500 Index
- One month put options are sold at each expiration
- The notional value of the short put position is fully collateralized by Treasury bills



Historical Returns

- From June 1986 to October 2008, the PutWrite Index earned a larger total return than stock and bond indices, with less volatility than stock indices
- Notice that the PutWrite Index outperforms in falling stock markets and underperforms in rising stock markets



Source: Bloomberg and CBOE

Risk Analysis

Key Statistics

June 30, 1986 to October 31, 2008

	Average Annual Return	Standard Deviation	Skewness	Kurtosis	Sharpe Ratio	Sortino Ratio
CBOE S&P 500 PutWrite Index	10.32%	9.91%	-2.72	13.15	0.63	0.86
S&P 500 Index	8.77%	15.39%	-0.92	3.06	0.30	0.49
MSCI EAFE Index	6.11%	17.39%	-0.49	1.26	0.12	0.19
Barclays Capital Aggregate Bond Index	7.16%	4.05%	-0.27	0.39	0.76	1.67
3-Month Treasury Bills	4.09%	0.53%	-0.04	-0.50	N/A	N/A

Source: Bloomberg and CBOE

The Payoff Profile

- The maximum return to the strategy in any month (measured expiration to expiration) is the sum of the put premium and the Treasury bill return
- In times of rapidly rising stock prices, the return to the PutWrite Index may be smaller than equity market returns
- This maximum return is earned in any month with a positive return to the stock market index
- Positive returns are earned in any month where the income earned exceeds the losses in the S&P 500
- The strategy will incur losses in any month where the S&P 500 declines more than the income earned
- In months of sharp equity market declines, the PutWrite Index will outperform the S&P 500 index by the amount of the income earned
- Historically, gains are more frequent than losses, but average losses exceed average gains

Scenario Analysis

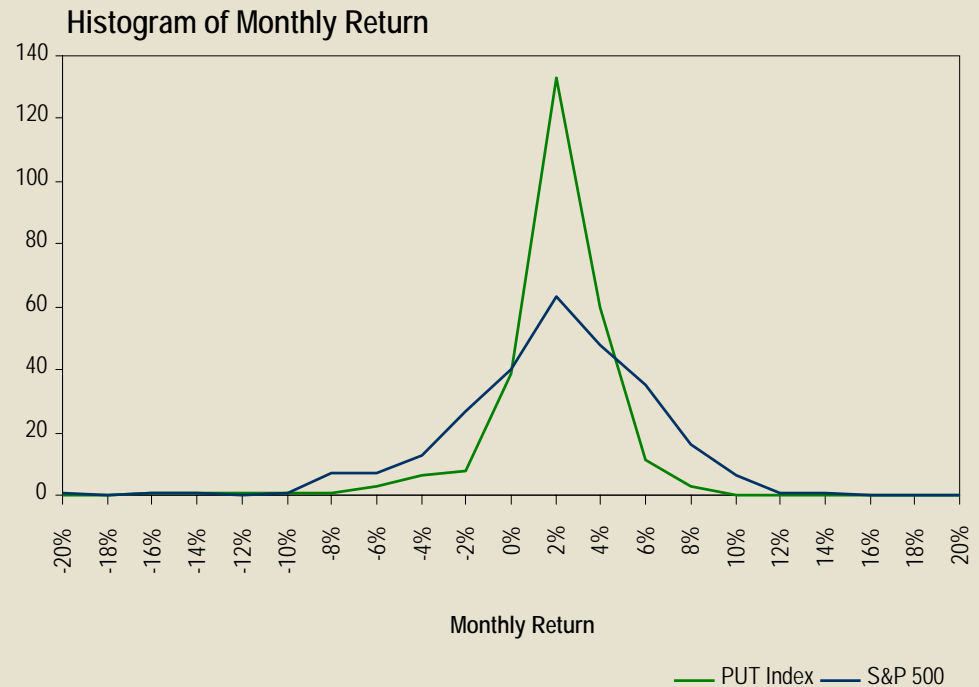
Monthly Return Profile of the CBOE S&P 500
PutWrite Index Relative to S&P 500 Return State
June 30, 1986 to October 31, 2008

	% of Months	PUT Index Return	Monthly Standard Deviation	S&P 500 Index Return	Correlation
State 1: Large positive return	48.7%	2.11%	0.86%	4.14%	0.49
State 2: Relatively unchanged market	29.2%	1.67%	0.85%	-0.08%	0.52
State 3: Large negative return	22.1%	-2.93%	4.51%	-5.38%	0.98

Source: Bloomberg and CBOE

Distribution of Returns

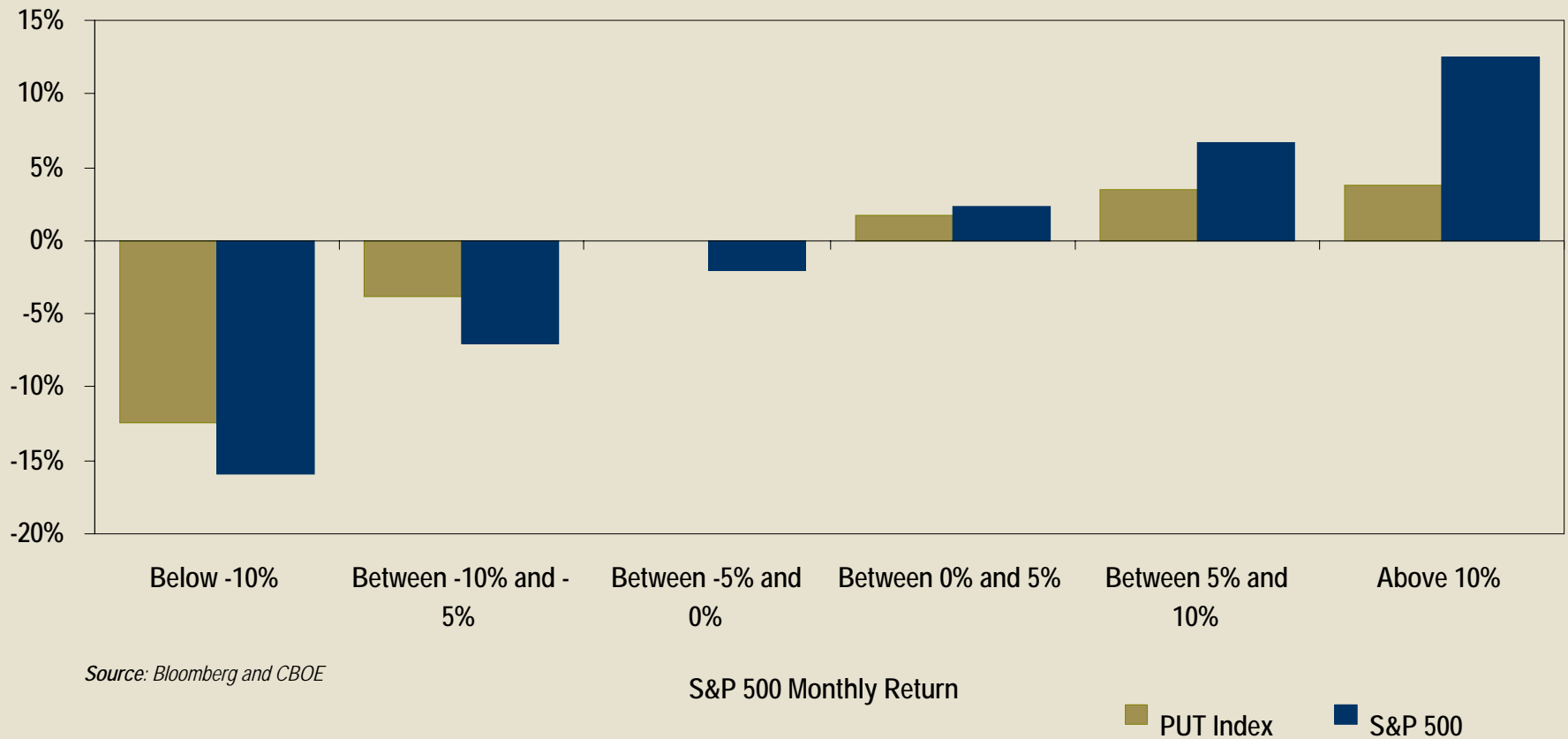
- The histogram demonstrates the lower volatility of the PutWrite Index when compared to the S&P 500 Index
- Returns are clustered around the average monthly income of 1.6%
- The PutWrite has a non-normal return distribution with fatter tails and negative skewness, as the downside return potential exceeds the truncated upside return



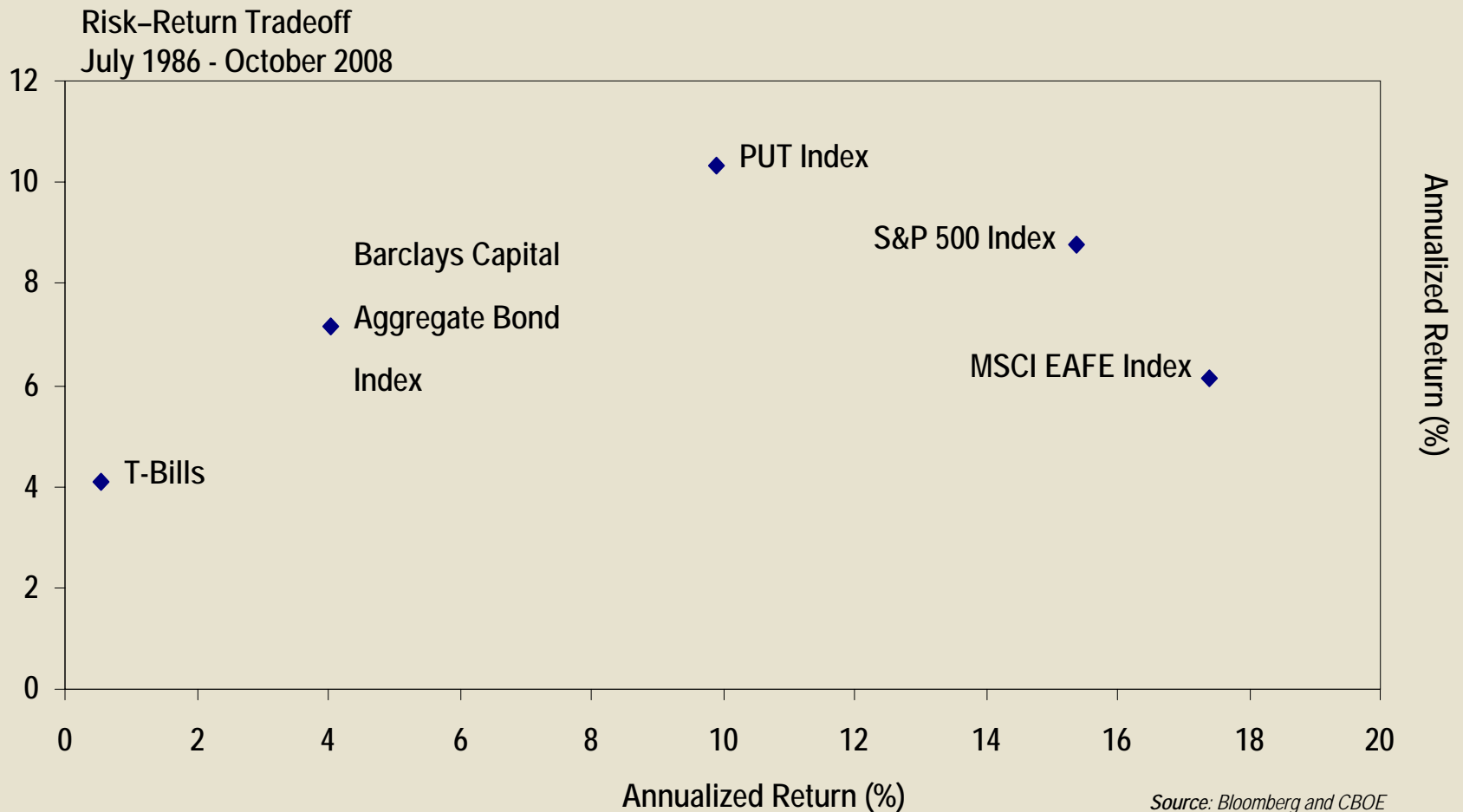
Source: Bloomberg and CBOE

Returns Sorted by S&P 500 Returns

Exhibit 6: Average PUT Returns Sorted by S&P 500 Returns
July 1986 - October 2008



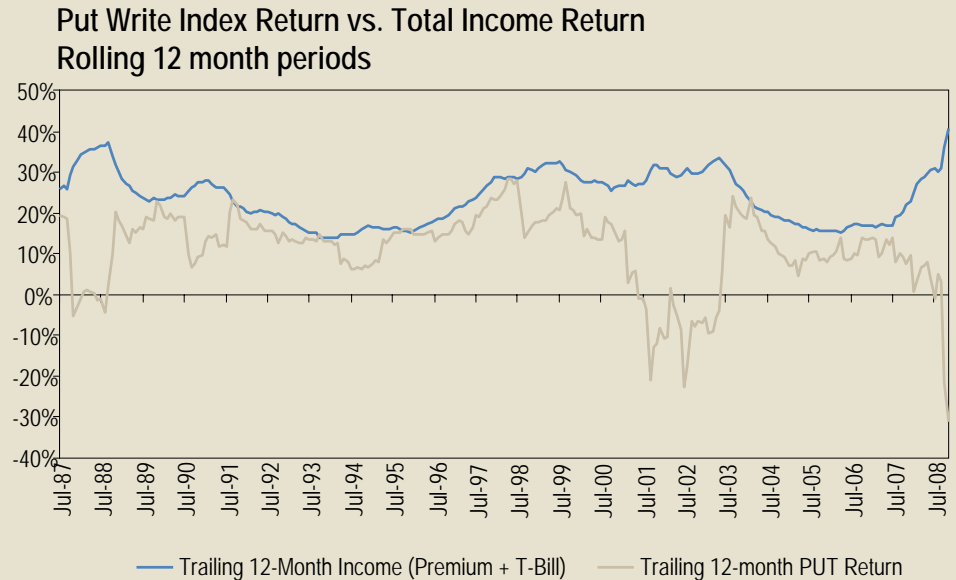
Risk-Return Tradeoff



Traditional and Exotic Betas

- The PutWrite Index earns returns from multiple sources
- Traditional beta returns are earned from Treasury bills and the downside risk of the S&P 500 Index
- Exotic beta returns are earned from the put option income, which is highly correlated to the CBOE Volatility Index, VIX
- Average annual returns:

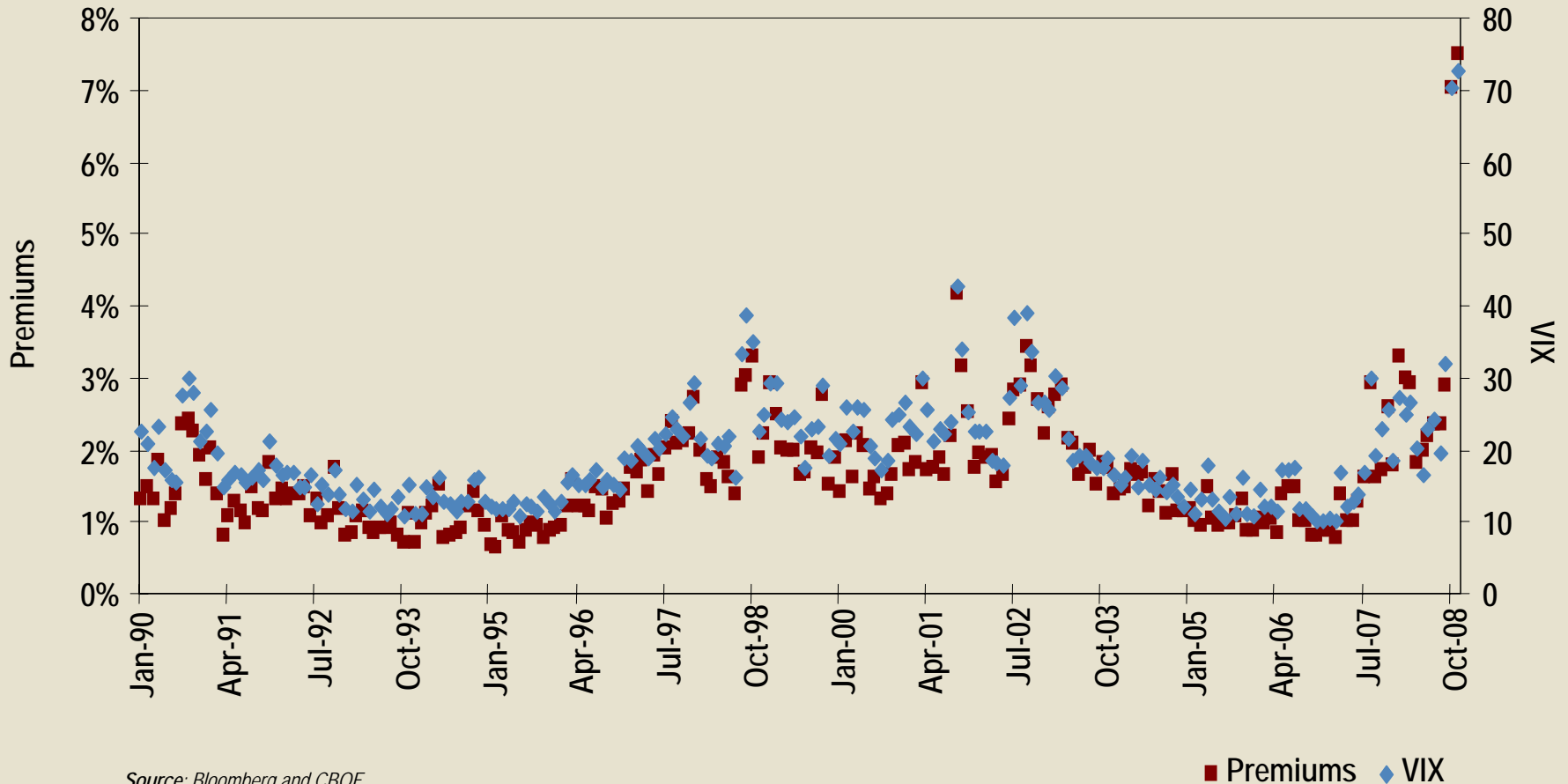
Treasury Bills	+ 4.2%
Put Option Income	+ 19.8%
Less Stock market Risk	- 13.7%



Source: Bloomberg and CBOE

Premium Income is Correlated to VIX

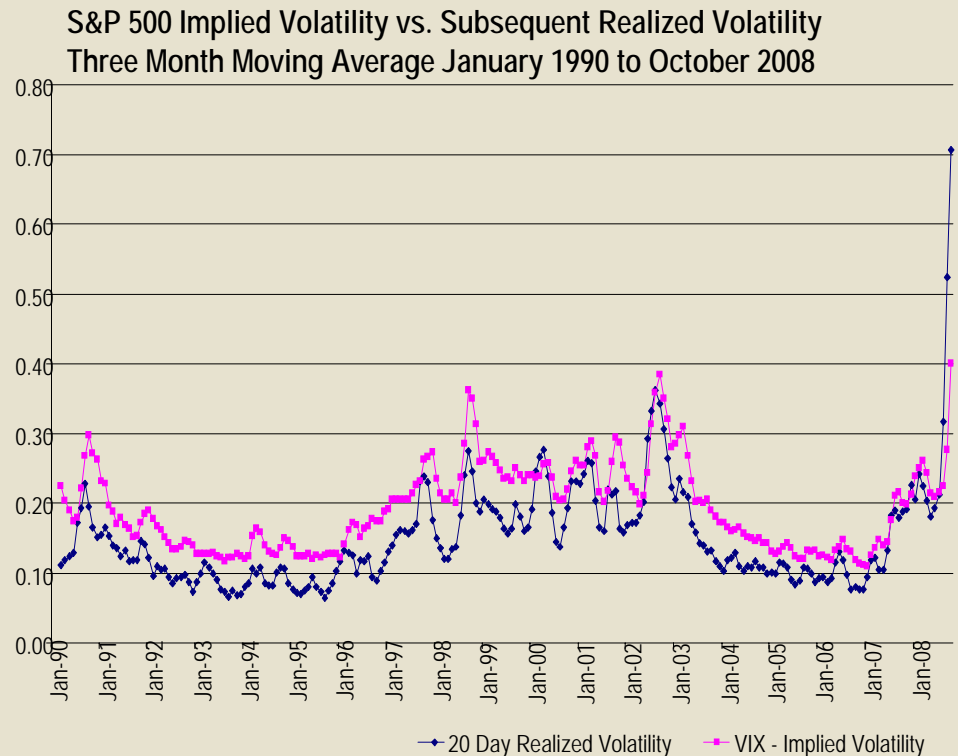
Monthly Put Gross Premiums vs. VIX Closing Prices



Source: Bloomberg and CBOE

The Source of Excess Returns

- The implied volatility of index options is typically higher than realized volatility
- The sale of one month options takes advantage of the accelerating time decay



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